ICPIC P246

0.045% DAC N-055 A CHOICE FOR POOR AFGHAN SURGICAL PATIENTS?

Medical Faculty of Balkh University

Waisenmedizin (WM e.V.) – PACEM
Promoting Access to Care with Essential Medicine

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INTRODUCTION

Problems to deal with in Afghanistan are: Poor patients and hospital hygiene, drug corruption, high rate of antibiotic resistance, counterfeit antibiotics, absence of lab proof of germs associated with antibiogram.

Afghanistan is in need of an antiseptic tissue regeneration promoter for intra- and postoperative topical use to deal with frequent bone & soft tissue infections in orthopaedic surgery.

O_2-enriched pharmaceutical chlorite [$NaClO_2$ German Drug Codex DAC N-055, 1990; Oxoferin® registered in 1983]:

- contains $NaClO_2$ **and** the peroxy-di-chlorate **$Na_2Cl_2O_6$** formerly designated as TCDO, $(NaClO_2)_4 \cdot O_2$
- releases potent disinfectant **$\cdot ClO_2$ at pH 6** (225 ppm)
- cheaper than antibiotics with no development of resistance
- fights soft tissue infections, mostly presenting acidic pH values (pH 4 - 6)
- promotes wound granulation, even in most difficult wounds
- such as radiogenic ulcers [http://www-pub.iaea.org/mtcd/publications/pdf/te_1300_web.pdf].

Chronic osteomyelitis closed irrigation

Chronic osteomyelitis of the femur without sequestrum, 0.05% *Na-chlorosum* drip into the cavity for 14 days

Still open sinuses after 5 months

Drainage is a must and primary wound closure is contra-indicated with Na-chlorosum bone cavity drips

METHODS AND PATIENTS

Descriptive phase V study conducted in the former Military Hospital in Mazar 2004 - 2005 with 26 patients (22 chronic osteomyelitis, 2 septic arthritis, 2 open fractures, 1 diabetic foot ulcer) to determine whether "the therapeutic effect of the German officinal drug DAC N-55 is realized also in day-to-day clinical practice in Afghan surgery" and to familiarize ourselves with this officinal drug first registered as finished drug (Oxoferin®) in Germany in 1983

4.5% DAC N-055 was diluted 1:100 in physiological saline or Ringer-Lactate Buffer prior to use and administered as follows:

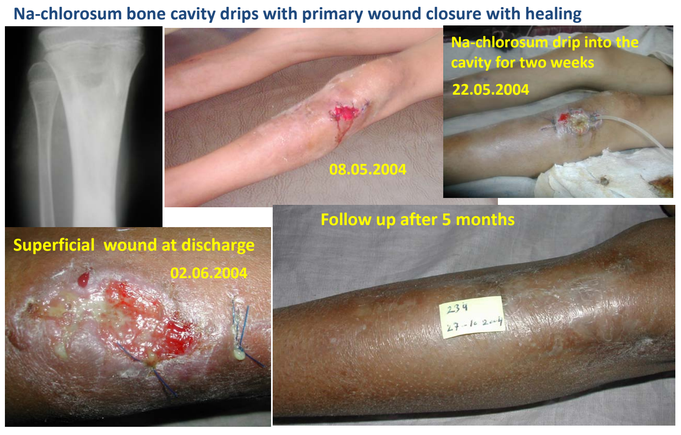
- repeated intra-operative operation field rinsing
- post-op. irrigations (closed and later open) into the bone cavity
- intra-articular irrigations (4x per day) (joints with drain!)
- moist wound dressings (cotton gauzes moistened with drug 0.045% DAC N-055 in 0.9% NaCl

Here we document 6/26 cases in more detail

Chron. osteomyelitis exceptional healing inspite of primary closure

12 year old boy with tibia osteomyelitis, 1st surgery on 8.5.2004, 1 week of cloxacillin
2nd surgery on 15.05.04 with intra- and post-op. irrigation of 0.045% Na-chlorosum

Na-chlorosum bone cavity drips with primary wound closure with healing



RESULTS with 0.045% Na-chlorosum

11/22 osteomyelitis cases could be monitored 5 to 18 months. 6/11 cases not treated with open bone cavity irrigations relapsed with sinuses within this period. For 8/11 patients antibiotics had not been available.

Without antibiotics, both septic arthritis cases had an excellent functional outcome after 6 weeks

The open fracture with skin defect received mesh graft on excellent granulation after 1 month and was completely closed after 3 months.

The mal perforans of the diabetic foot could be closed within 50 days but reopened after 2 years in the absence of anti-diabetic medication.

Chron. osteomyelit. open irrigation

Chronic osteomyelitis of femur from a bullet injury, no antibiotic was used

Na-chlorosum bone cavity drips with drainage and secondary wound closure

DISCUSSION

For septic arthritis, the "initial continuous irrigation phase" of the drip with 16 drops per minute 0.045 % sodium chlorosum in Ringer lactate buffer can be expanded for >4 days.

"Discontinuous cavity injection" with a special tube allowing an interval drainage should be tried: After an initial irrigation phase of 24 hours, the cavity is filled and the wound exit tube is only opened at intervals of several hours to be refilled after evacuation (see Figure 1).

For chronic osteomyelitis treatment the subsequent discontinuous phase (instillation of 2 x 50 ml per day) should be expanded for an additional week with a lower concentration (25 µM instead of 5000 µM = 0.045%) for BM reconstitution. At this concentration Na-chlorosum has stimulated BM regeneration after 12 Gy lethal gamma irradiation in rodents (**Ivankovic, S. and S.R. Kempf, *„Regenerative effects of TCDO in BD IX rats after total-body gamma irradiation*" Radiat. Res., 115 (1): 115-123, 1988**).

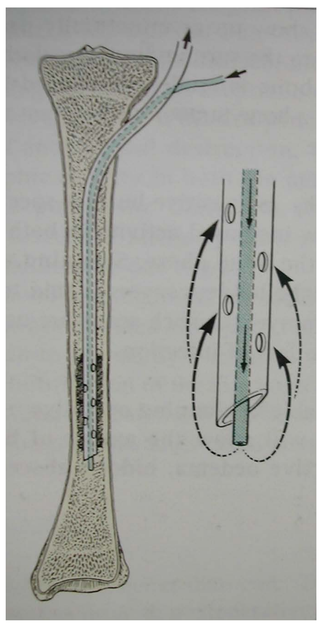


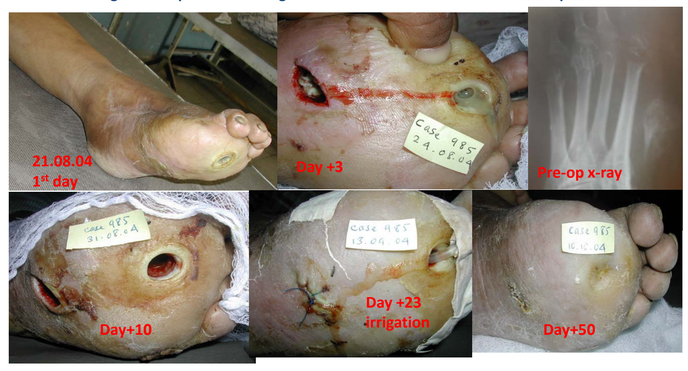
Figure 1:
Discontinous cavity injection

Chronic septic arthritis

After a motor bike accident on March 21st 2004, ORIF was practiced twice in Iran, because of fractured patella (wire sticking out) excellent functional therapeutic results without any pain!
Because of too much fibrin in the joint intra- and continuous post-operative Na-chlorosum irrigation with drainage for the first 5 days and subsequent interval filling of joint for 9 days

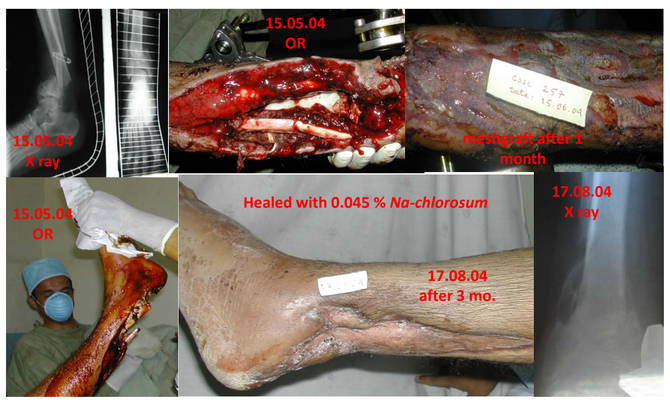
Diabetic Foot (Mal perforans)

67 years old ♂ with paralysis of N. peronaeus after war injury of the knee, diabetes was diagnosed on 10.09.04, patient received no antibiotics, had a nearly closed wound on discharge! Patient did not follow anti-diabetic treatment, he relapsed in 2006 and consented to fore-foot amputation
MWT & moist gauze tamponade and irrigation with 0.045% Na-chlorosum after sequester removal



Open lower leg fracture, Gustilo-3B

20 years ♂ injury from motorcycle accident 1st DBR was made 24h after the injury fracture was stabilized by an external fixator on 15.05.04, completly closed after 3 mo.
0.045% Na-chlorosum was used intra-operatively and then for everyday MWT



ACKNOWLEDGEMENT

The partial financial support of the German Academic Service (DAAD) within the frame work of capacity building in Afghanistan is gratefully acknowledged. H. Darmangar acknowledges two DAAD fellowships at the Traumatology Department (Prof. Südkamp) University of Freiburg, Germany

CONCLUSION

Peroxy-dichlorate in Na-chlorosum has 3 chemical pathways. Pathways (1) and (3) fight infection (1) and stimulate tissue regeneration (3) and should be further exploited in bone cavity drips after surgical intervention in chronic osteomyelitis.

(1) $^{-}{}_2OCl^{(IV)}OO^{(IV)}ClO_2^{-} + \mathbf{2H^+} \rightarrow H_2O_2 + 2\ ClO_2$; (pH<6)

(2) $^{-}{}_2OCl^{(IV)}OO^{(IV)}ClO_2^{-} + \mathbf{h*v} \rightarrow {}^1O_2 + 2\ ClO_2^{-}$; (366 nm)

(3) $2\ ClO_2^{-} + 2\ Hb\text{-}Fe^{2+} \rightarrow 2\ Hb\text{-}Fe^{3+}O^{-} + 2\ {}^{-}OCl$; (pH 7.4)

$^{-}{}_2OCl^{(IV)}OO^{(IV)}ClO_2^{-} + Hb\text{-}Fe^{3+} \rightarrow ClO_3^{-} + ClO_2^{-} + {}^{\bullet+}Hb\text{-}Fe^{(IV)}{=}O$

${}^{\bullet+}Hb\text{-}Fe^{(IV)}{=}O$: heme−$Fe^{(IV)}$−O porphyrin π-cation radical